Maximum size of Atlantic mackerel (*Scomber scombrus*) and Atlantic chub mackerel (*Scomber colias*) in the Northeast Atlantic

by

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RÉSUMÉ. - Taille maximale du maquereau commun (*Scomber scombrus*) et du maquereau blanc (*Scomber colias*) du nord-est atlantique.

Cette étude présente des données sur la taille maximale du maquereau commun capturé dans différentes zones de l'océan Atlantique nord, ainsi que celle du maquereau blanc dans le golfe de Cadix, Espagne. Un spécimen de maquereau commun du nord-est Atlantique (*Scomber scombrus* Linnaeus, 1758), a été capturé dans le sud du golfe de Gascogne, en 2009. Sa longueur totale de 59 cm et son poids de 1,9 kg représentent la taille et le poids maximum pour cette espèce enregistrés dans cette région. Les données recueillies pour 19 spécimens de grande taille en mer de Norvège depuis 1980 indiquent une taille maximale de 70 cm et un poids maximum de 3,2 kg. Cette information montre également que la taille du maquereau commun tend à diminuer, certainement en raison de la pression de pêche. Les spécimens capturés récemment (2000-2005) ont une taille comprise entre 50 et 55 cm, comparée à la taille maximale de 70 cm des années précédentes. En 2007, un spécimen de maquereau blanc (*Scomber scolias* Gmelin, 1789) a été capturé dans le golfe de Cadix. Sa longueur totale de 65 cm et son poids de 2,9 kg représentent la taille et le poids maximum pour cette espèce. Le maquereau commun du nord-est Atlantique et le maquereau blanc capturés sur les côtes espagnoles étaient âgés de 20 ans (otolithométrie), ce qui représente la plus longue longévité répertoriée pour ces deux espèces dans cette région.

Key words. - Scombridae - *Scomber scombrus* - *Scomber colias* - Northeast Atlantic - Maximum length - Maximum weight - Maximum age.

Maximum length, weight and age are important parameters used in life history studies and fishery science. These measurements are applied directly or indirectly in most stock assessment models (ICES, 2009). Therefore, it is important to regularly update the maximum size of commercially important species.

Atlantic mackerel *Scomber scombrus* (Linnaeus, 1758) and Atlantic chub mackerel *Scomber colias* (Gmelin, 1789) are the two members of the genus *Scomber* inhabiting northwestern European seas (Collette, 2003). Their distribution coincides in the northeast Atlantic; however, *S. colias* also inhabits waters further south.

Atlantic mackerel is an abundant middle-sized pelagic fish, which is intensely exploited in the North Atlantic (Csirke, 1995). The northeast Atlantic stock is abundant and distributed from the south of the Iberian Peninsula to the north of Norway. It is an important target of the traditional fishery in the northeast Atlantic, and it has a high social and economic value for all the European coastal countries (Villamor, 2008). Therefore, many international organizations currently have active plans for evaluating and managing it (ICES, 2009).

Atlantic chub mackerel is also an abundant middle-sized pelagic fish. It has a wide distribution in the eastern Atlantic from the Canary and Azores Islands to the Bay of Biscay. Atlantic chub mackerel is not a target species of the Spanish fleet operating in the ICES area; however, the landings of this species have shown an increasing trend since 1999 (ICES, 2009).

The aim of this paper is to present data on the maximum observed length, weight and age of the Atlantic mackerels caught on the Spanish and Norwegian coasts and the Atlantic chub mackerel caught on the Spanish coast.

MATERIAL AND METHODS

A specimen of Atlantic chub mackerel was caught at the end of July 2007 by a commercial longline in the Gulf of Cadiz (35°58'N; 6°15'W; 88 m depth). It was stored frozen and sent to the Spanish Institute of Oceanography (IEO). An Atlantic mackerel specimen was caught on 13 March 2009 by a commercial gillnet vessel in the Bay of Biscay (43°29'N; 4°46'W; 110 m depth) and was sent fresh to the IEO. Biological sampling data were taken. Otoliths were removed and stored for a later reading. Both specimens were stored frozen at the IEO [IEO-ST-E-0701 (*S. colias* specimen) and IEO-ST-C-0901 (*S. scomber* specimen)].

The total and fork lengths of the two specimens were measured to the nearest mm. Total and eviscerated weights were determined to the nearest 1 g, and the organs were weighed to the nearest 0.01 g. Sex and maturity stage were determined according to the external appearance of the gonad based on the Walsh Maturity Key (Walsh *et al.*, 1990) and following the recommendations of the Workshop of Mackerel Maturity (ICES, 2007).

The Institute of Marine Research, Bergen, Norway, has been collecting data on large Atlantic mackerels caught in Norwegian waters from reports in newspapers and magazines as well as fish reported or sent to the institute since 1980. Currently there is information on a total of 19 individuals. Until 2001, only length and weight of the specimens were recorded (a total of 15); after this date, data on sex and maturity stage as well as age (last four specimens) were also collected. Total length was measured to the nearest cm and total weight was measured to the nearest 0.1 kg in some

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Table I. - Biological sampling data including date of catch, location, total length (TL), weight (W), sex, maturity and age (years). * There must be a misprint, probably in weight. It is most likely 2.4 kg for a length of 54 cm. ** Norwegian maturity scale (ICES, 2007). *** Walsh maturity scale (Walsh *et al*., 1990). – Not available.

	Species	Date	Latitude	Longitude	ICES Area	TL (cm)	W (k)	Sex	Maturity	Age	Source
Norwegian Sea	*S. scombrus*	1968-1969	–	–	–	58.5	2.300	–	–	–	Commercial catch
	S. scombrus	Jul. 1980	60º00'N	5º30'E	IVa	63.0	2.500	–	–	18	Commercial catch
	S. scombrus	1981-1982	61º35'N	4º20'E	IVa	61.5	2.200	–	–	–	Reported by telephone
	S. scombrus	Jun. 1983	61º51'N	4º47'E	IVa	63.0	2.600	–	–	–	From newspaper
	S. scombrus	Feb. 1984	62º55'N	5º25'E	IIIa	70.0	3.000	–	–	–	Commercial catch
	S. scombrus	Nov. 1985	58º20'N	11º10'E	IIIa	65.0	2.435	–	–	–	From newspaper
	S. scombrus	Oct. 1988	-	-	-	60.0	2.200	–	–	–	From newspaper
	S. scombrus	Nov. 1991	58º40'N	9º20'E	IIIa	68.0	3.200	–	–	–	From newspaper
	S. scombrus	Oct. 1992	58º25'N	8º50'E	IIIa	63.0	2.880	–	–	–	Commercial catch
	S. scombrus	Jun. 1997	59º50'N	10º30'E	IIIa	54.0*	3.4*	–	–	–	From newspaper
	S. scombrus	Sep. 2000	58º15'N	3º30'E	IVa	55.0	2.500	–	–	–	Commercial catch
	S. scombrus	Oct. 2001	60º15'N	3º30'E	IVa	53.0	1.347	–	–	–	Commercial catch
	S. scombrus	Nov. 2001	58º55'N	10º00'E	IIIa	-	1.980	–	–	–	From newspaper
	S. scombrus	Oct. 2002	60º42'N	4º55'E	IVa	-	2.010	–	–	–	From newspaper
	S. scombrus	Aug. 2004	59º35'N	5º06'E	IVa	55.0	1.800	–	–	–	From newspaper
	S. scombrus	Autum 2005	–	–	–	50.0	1.428	Female	VII - Spent**	14	Commercial catch
	S. scombrus	Autum 2005	–	–	–	51.0	1.382	Female	VII - Spent**	15	Commercial catch
	S. scombrus	Autum 2005	–	–	–	52.0	1.704	Female	VII - Spent**	13	Commercial catch
	S. scombrus	Autum 2005	–	–	–	53.0	1.667	Female	VII - Spent**	13	Commercial catch
Spanish Coast	*S. scombrus*	Mar. 2009	43º29'N	4º46'W	VIIIcE	59.2	1.953	Female	III - Late ripening***	20	Commercial catch
	S. colias	Jul. 2007	35º58'N	6º15'W	IXaS	65.0	2.886	Female	VI - Spent***	20	Commercial catch

cases and to the nearest 0.001 kg in other cases. Sex and maturity stage were determined based on the external appearance of the gonad according to the Norwegian maturity scale (ICES, 2007).

Age was assigned to the Atlantic mackerel according to the method described in ICES (1995), i.e. by observing the sagittal otoliths under a microscope with reflected light. The same criteria were used for Atlantic chub mackerel otoliths because they have a similar structure, although they have a different shape (Lucio, 1997; Martins, 2007).

RESULTS AND DISCUSSION

The results of the analysis of the specimens caught on the Spanish and Norwegian coasts are shown in table I.

The maximum known total length in the literature for Atlantic mackerel is 60 cm and the maximum total weight is 3 kg (Muus and Nielsen, 1999). The maximum known total length for Atlantic chub mackerel is 54 cm (Martins, 1996). However, as we can see in table I, Atlantic chub mackerel can reach a length of 65 cm and a weight of 2.9 kg, and Atlantic mackerel can reach a length of 70 cm and weight of 3.2 kg. These specimens prove that these species can grow more than the length and weight considered previously to be the maximum. The data in table I also show that the larger size in the Norwegian Sea of Atlantic mackerel reported most recently (2000-2005) is 55 cm compared to 70 cm in earlier years. This decrease in the larger sizes could be due to fishing pressure. In fact, the largest Atlantic mackerel reported in more recent years (since 1997) is the specimen caught on the Spanish coast, which had a length of 59 cm and a weight of 1.9 kg (Tab. I).

The Norwegian specimens of Atlantic mackerel whose otoliths were read (last four specimens, from 50 to 53 cm total length) were 12-15 years old, and the specimen caught on the Spanish coast was 20 years old (Tab. I). The maximum known age in the literature is 18 years old (44 cm) for Atlantic mackerel on the Spanish coast (Villamor, 2004). However, there has been a mackerel caught in northern Europe that was 23 years old (48 cm) (ICES, 1995). The Atlantic chub mackerel caught on the Spanish coast was 20 years old (Tab. I), and the maximum age recorded in the literature for chub mackerel is 12 years old (54 cm) (Martins, 1996). Therefore, these specimens show that these species can reach older ages than those considered previously to be the maximum age. It would have been interesting to know the age of the largest mackerels (from 60 to 70 cm total length), as they would almost definitely have been even older.

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